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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to eye contacting parts, such as a medical-application microscope, at the system control station whose display of other images was enabled. [0002]

[Description of the Prior Art] Conventionally, there is an endoscope integration system as a system which controls two or more medical equipment. This carries out communications control of two or more devices, and is performing remote operation by one concentration control panel.

[0003] On the other hand, in the operation microscope field, a display means is formed in an eye contacting part, and the display within a visual field which expresses an image other than an observation image is performed (for example, JP,7-261094,A). In order to display two or more images, he switches a display image and was trying to make it display with a change means in the display within a visual field.

[0004]

[Problem(s) to be Solved by the Invention] In this case, these change actuation became it complicated that images were a large number in the conventional example, and it was very inconvenient. Moreover, in case a microscope image and the image displayed in a visual field are made shown a monitor table, these change actuation is also needed. Furthermore, there was no system which can operate the display of a monitor by remote control in the microscopic field in this way.

[0005] Moreover, when directions were issued by the nurse etc. by observation of the image with which the way person is displayed in the microscopic field, since the nurse was observing a different image from what the way person is generally observing in many cases, she could not cope with it easily smoothly.

[0006] (The object of invention) It was made in view of the point mentioned above, a nurse etc. can observe an image equivalent to the observation image which the way person is observing actually, and this invention aims at offering a system control station with the sufficient user-friendliness which is easy to advance an operation etc. more smoothly.

[0007]

[Means for Solving the Problem] The eye contacting part for observing the object for observation, and the display means for eyepieces which can display an image on said eye contacting part, The picture signal generator which generates the 1st and 2nd video signal, and the means for switching which switches and displays the image by the 1st and 2nd video signal on said display means for eyepieces, By having had the control means controlled to interlock and to switch a display means to have the display screen of predetermined magnitude, the display in said eye contacting part, and the display in said display means By observing the image displayed on a display means, a nurse etc. can observe an image equivalent to the image which the way person is observing, and can offer the environment where it is easy to perform treatment by cooperation with a way person and a nurse more smoothly.

[0008]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing.

Drawing 1 thru/or drawing 8 start the gestalt of operation of the 1st of this invention. (Gestalt of the 1st operation) Drawing 1 shows the whole endoscope surgery system configuration which constitutes the

gestalt of the 1st operation. Drawing 2 shows the configuration of the system control station of the body in drawing 1, and drawing 3 indicates the example of a display in a monitor to be the display of a microscope eye contacting part. Drawing 4 shows the schematic diagram of a control-panel actuation screen, drawing 5 shows the Main screen by the monitor, drawing 6 shows one example of an image selection screen, drawing 7 shows the part which moves in the display area within a visual field, and drawing 8 shows the example of a display in case the TV camera is not connected to the image switcher.

[0009] As shown in drawing 1 (the system control station of this invention is constituted concretely), in the endoscope surgery system 1, the operation microscope 5 is arranged for the trolley 4 with which two or more medical equipment was carried in one patient 3 side who lies on an operating table 2 in another side.

[0010] As a display means which ultrasonic observation equipment 6, TV camera (for endoscopes) equipment (or camera control unit) 7, light equipment 8, image recording equipment 9, the image switcher 10 that performs a change-over of an image, a nurse, etc. observe to a trolley 4 A monitor 12, a nurse, etc. who have the display screen of predetermined magnitude concentrate actuation of medical equipment. The system controller 16 grade which performs control of the display controller 14 within a visual field which controls the display within a visual field of the concentration control panel 13 to perform and an operation microscope 5, mixers 15, and such whole medical equipment is carried. Each medical equipment is connected with a system controller 16 through the cable which is not illustrated, and the bidirectional communication link is attained.

[0011] Moreover, the display system 14 within a visual field is connected with the operation microscope 5 through the cable 17. Moreover, the ultrasonic probe (or ultrasound endoscopy) 18 which gives a patient 3 ultrasonic diagnosis to this patient 3, and the endoscope 19 which conducts endoscopy are stabbed by the inside of the body and the twist concrete target in a brain.

[0012] A cable 21 connects with ultrasonic observation equipment 6, and ultrasonic observation equipment 6 performs signal processing to the echo signal at the time of scanning the supersonic wave by the ultrasonic probe 18, and generates the video signal of an ultrasonic image, and the ultrasonic probe 18 outputs it to a monitor 12 through the image switcher 10 and a mixer 15, and can display an ultrasonic image.

[0013] Moreover, an endoscope 19 is connected with light equipment 8 by the light guide cable 22 which transmits the illumination light, the illumination light from light equipment 8 is supplied to the light guide of an endoscope 19 through the light guide cable 22, outgoing radiation of the illumination light transmitted by this light guide is carried out from the illumination window which the point of the insertion section 23 of an endoscope 19 does not illustrate, and it illuminates a patient's 3 inside of the body.

[0014] Moreover, the eye contacting part prepared in the back end side of the insertion section 23 of this endoscope 19 is equipped with the camera head 24 which built in the image sensor, and the optical image transmitted to the eye contacting part side through the observation optical system of an endoscope 19 is picturized with the image sensor of a camera head 24, and is inputted into TV camera equipment 7 through camera cable 25. This TV camera equipment 7 generates the video signal of an endoscope image (endoscope image), outputs it to a monitor 12 through the image switcher 10 and a mixer 15, and can display an endoscope image.

[0015] Moreover, remote control 26 is formed in the bed 2, and a way person can perform control of delivery and medical equipment for a manipulate signal to a system controller 16 through a cable 27 by operating this remote control 26.

[0016] On the other hand, an operation microscope 5 has the stand 31 which has base 31a which can move to a floor line freely, and stanchion 31b set up on this base 31a, the 1st arm 32 which built in the light source for lighting which is not illustrated is formed in the upper bed of this stanchion 31b, and the end of this 1st arm 32a is attached in the stand 31 free [rotation] centering on Shaft Oa. The end of 2nd arm 32b is attached in the other end of 1st arm 32a free [rotation] centering on Shaft Ob.

[0017] In order to perform vertical migration actuation, 2nd arm 32b is a pantograph arm which consists of a gas spring for a link mechanism and balance adjustment, and is attached in the other end free [rotation of the end of 3rd arm 32c] centering on Shaft Oc. Furthermore, the forward-and-backward inclination arm 32d end face section is attached in this 3rd arm 32c free [rotation] centering on Shaft

Od.

[0018] The observation head 33 of an operation microscope 5 is attached in the this forward-and-backward inclination arm 32d point free [rotation] centering on Shaft Oe. The mirror body section 34 of an operation microscope 5, the eyepiece optical unit (eye contacting part) 35 for taking a measure by a way person observing, and the handle 36 are formed in this observation head 33.

[0019] And this observation head 33 is supported where forward-and-backward inclination of the cross direction to the observation direction of the way person of the mirror body section 34 centering on Shaft Od and forward-and-backward inclination of the longitudinal direction of the way person centering on Shaft Oe are enabled respectively. The amplification optical system 37 (refer to drawing 2) for observation of right-and-left both eyes and the image sensor 38 of the right and left which picturize the expanded microscope image are arranged at the mirror body section 34, and the output signal of the image sensor 38 on either side is outputted to the TV camera equipment 39 (refer to drawing 2) formed in the proper location (or a trolley 4 may be used) of a stand 31.

[0020] Moreover, as shown in drawing 2 , the eyepiece optical system 40 on either side and the eyepiece viewing monitor (an eyepiece monitor and brief sketch) 41 of right and left (as a display means for eyepieces) are arranged at the eyepiece optical unit 35, the microscope image picturized by TV camera equipment 39 is displayed on the eyepiece monitor 41 on either side through the image switcher 10, and the way person enables it to observe a microscope image in an eyepiece visual field through the eyepiece optical system 40 on either side.

[0021] Drawing 2 shows the configuration of the display system in the system 1 of drawing 1 . The ultrasonic image picturized with the ultrasonic probe 18 to a patient 3 is inputted into ultrasonic observation equipment 6, and the video signal of the ultrasonic image outputted from this ultrasonic observation equipment 6 is inputted into an image switcher 10, and it can display on the eyepiece monitor 41 of right and left of a microscope 5 through the display controller 14 within a visual field connected to the image switcher 10 while being able to display on a monitor 12 through the mixer 15 connected to the image switcher 10.

[0022] Moreover, the endoscope image picturized by the camera head 24 with which the endoscope 19 was equipped is inputted into TV-camera equipment 7, and the video signal of the endoscope image outputted from this TV-camera equipment 7 is inputted into an image switcher 10, and it can display on the eyepiece monitor 41 of right and left of a microscope 5 through the display controller 14 within a visual field connected to the image switcher 10 while being able to display on a monitor 12 through the mixer 15 connected to the image switcher 10.

[0023] Moreover, the microscope image picturized with the image sensor 38 of right and left of an operation microscope 5 is also inputted into TV camera equipment 39, and the video signal of the microscope image outputted from this TV camera equipment 39 can be displayed on a monitor 12 through the image switcher 10 and a mixer 15 while it is inputted into the eyepiece monitor 41 on either side, without passing through the image switcher 10 and is displayed on that microscopic field.

[0024] Moreover, with the gestalt of this operation, it has a navigation system 42 and the display to a monitor 12 and the eyepiece monitor 41 on either side also of the positional information by this navigation system 42 is enabled through the image switcher 10.

[0025] Moreover, a change-over of the image switcher 10 is controlled through a system controller 16, and it enables it to choose the display of a monitor 12 and the eyepiece monitor 41 of the eyepiece optical unit 35 by operating the concentration control panel 13 with the gestalt of this operation.

[0026] Drawing 3 shows the display screen by the monitor 12, and the display screen (screen within a visual field) by the eyepiece monitor 41.

[0027] PinP screen 12b displayed on the parts of parent screen 12a for displaying on a monitor 12 in the whole monitor display and this parent screen 12a, for example, the upper left, by the picture in picture (PinP and brief sketch) is formed.

[0028] Moreover, circular microscopic-field 41a, and the display H1 within a visual field (area) which is cut, and is displayed on it as lacks into an upper left part and the display H2 within a visual field (area) formed in circular microscopic-field 41a, for example, a lower part, of this circular microscopic-field 41a are formed in the eyepiece monitor 41. Therefore, a microscope image is always displayed on microscopic-field 41a circular to the eyepiece monitor 41, and other images can be further chosen and displayed on the displays H1 and H2 within a visual field through the display controller 14 within a

visual field of drawing 1 . In addition, the eyepiece monitor (right and left) 41 may be constituted from one liquid crystal display monitor etc., respectively, and may consist of two or more liquid crystal display monitors etc.

[0029] Drawing 4 shows display screen 13a of the concentration control panel 13 which performs selection of the display by the monitor 12 and the eyepiece monitor 41, setting out, etc. While the screen selecting-switch section 51 of a monitor 12 and the display selecting-switch section 52 within a visual field (eyepiece monitor 41) are displayed, the monitor status-display section 53 and the status-display section 54 within a visual field are displayed on display screen 13a of this concentration control panel 13, and the display interlock switch 55 is made to be displayed on it further.

[0030] The screen selecting-switch section 51 consists of parent screen selecting-switch section 51a and PinP screen selecting-switch section 51b, and three switches, the microscope image selecting switch S1 which specifically chooses a microscope image, the endoscope image selecting switch S2 which chooses an endoscope image, and the ultrasonic image selecting switch S3 which chooses an ultrasonic image are formed in these switch sections 51a and 51b, respectively.

[0031] Moreover, as for the display selecting-switch section 52 within a visual field, the endoscope image selecting switch S2 and the ultrasonic image selecting switch S3 are formed to the display area H1 and H2 within [of two] a visual field, respectively.

[0032] Moreover, he is trying to show in illustration the image [which is chosen by the monitor status-display section 53 and displayed on it by current parent screen 12a and PinP screen 12b] condition which shows in image condition illustration, and is chosen and displayed also on the status-display section 54 within a visual field in the display area H1 and H2 within [of two] a visual field.

[0033] Moreover, the display interlock switch 55 is formed and it enables it to set the content of a display by the content of a display with microscopic-field 41a of drawing 3 , and the display H1 within a visual field (area) to depend, and parent screen 12a by the monitor 12 of drawing 3 and PinP screen 12b as the display linkage condition which interlocked by operating this display interlock switch 55 and turning ON.

[0034] that is, since it enables it to display two images on a monitor 12 by PinP, besides the microscope image which a way person observes through the eyepiece optical system 40 Since nearby reference of the direction of the image displayed on the display area H1 within a visual field which cuts, and displays it as lacks a part of the visual field is carried out from the image displayed on the display area H2 within a visual field, he is trying to form the display mode which enables it to always display these two images also by the monitor 12 side.

[0035] If the display condition in microscopic-field 41a of the eyepiece monitor 41 of drawing 3 and the display area H1 within a visual field is in a microscope display condition and an endoscope display condition in the state of this display linkage Display that condition by text etc. in the status-display section 54 within a visual field of drawing 4 , and the text (microscope) which shows that it is a microscope image to a parent screen in the monitor status-display section 53 on it in this case The text (inside) which shows that it is an endoscope image to a PinP screen is displayed, a microscope image is displayed on parent screen 12a of the monitor 12 of drawing 3 , and an endoscope image comes to be displayed on PinP screen 12b.

[0036] Drawing 5 shows the Maine screen of the concentration control panel 13. The monitor status-display section 53 shown in drawing 4 and the status-display section 54 within a visual field are displayed, and the display interlock switch (drawing 5 display of the monitor linkage within a visual field) 55 is made to be expressed as this Maine screen further (M shows the text which shows that it is a microscope image here).

[0037] Where the display interlock switch 55 is turned on by drawing 5 , if the tag of the display within a visual field is chosen, it will come to be displayed in the state of the display which the content of a display by the content of a display with microscopic-field 41a and the display H1 within a visual field (area) to depend, and parent screen 12a by the monitor 12 and PinP screen 12b was interlocked with as shown in drawing 6 .

[0038] Moreover, with the gestalt of this operation, the means which carries out migration actuation of the PinP of the display within a visual field as shown in drawing 5 is established. If an off-switch is operated by drawing 5 , the display area H1 within a visual field will operate a left switch in the OFF location P0 of drawing 7 and a central switch will be operated in a location P1, if a right switch is

operated in a location P2, it will move to it in a location P3. Although drawing 7 showed only the typical location, it can indicate by migration still more finely on a multistage story by the actuation to push.

[0039] Moreover, with the gestalt of this operation, connection of the image switcher 10 is detected and the display with a monitor illustration (monitor status-display section 53) and the illustration (status-display section 54 within a visual field) of the display within a visual field is switched by the case where it connects, and the case of not connecting.

[0040] That is, when the image switcher 10 is connected, it turns out that a microscope image and an endoscope image are displayed on the monitor status-display section 53 as shown in drawing 5 etc., and the microscope image and the endoscope image are displayed on the status-display section 54 within a visual field.

[0041] It is only only displaying the mixer inputs 1 and 2 on a monitor line 53, as shown in drawing 8, and, displaying 1 grade which shows the Y/C input of the display controller 14 within a visual field in the status-display section 54 within a visual field on the other hand, when the image switcher's 10 is not connected.

[0042] Moreover, when a PinP scroll (actual screen) takes time amount (it is about 6 seconds at the maximum), he is trying for the gestalt of this operation to report that a screen frame is blinked and it is under migration on an illustration.

[0043] Thus, according to the gestalt of this constituted operation, a way person can set it as the condition of displaying freely an endoscope image, an ultrasonic image, etc. which are considered as the request other than a microscope image in an eyepiece visual field by selection actuation in the display selecting-switch section 52 within a visual field.

[0044] Moreover, a nurse or an assistant can maintain the display condition by operating the display interlock switch 55, when it wishes that a display condition equivalent to the image displayed on the display area H1 within a visual field other than the microscope image which a way person always observes actually will be maintained.

[0045] If directions are carried out so that the image with which it is in this condition, for example, a way person is displayed on the display area H1 within a visual field may be switched to other images, and a nurse or an assistant performs that actuation, the image displayed on the display area H1 within a visual field will be switched to other images. Then, the display image in PinP screen 12b in a monitor 12 is also interlocked with the switch, and is switched to other images.

[0046] Therefore, since the nurse etc. is observing the equivalent image when directions are issued while a way person observes an observation image since a nurse etc. can always observe two images equivalent to two images (image) which the way person is observing, it can perform easily performing treatment corresponding to directions, and actuation more smoothly, and carrying out for a short time more tends to undergo an operation etc. more smooth.

[0047] (Gestalt of the 2nd operation) The gestalt of operation of the 2nd of this invention is explained below with reference to drawing 9. Drawing 9 prepares 2nd monitor 12' further in drawing 2, and this 2nd monitor 12' is connected with the mixer 15.

[0048] Moreover, this 2nd monitor 12' can choose now the image displayed by actuation of the concentration control panel 13. In this case, the screen selecting-switch section 51 of drawing 4 can choose now the image further displayed on 2nd monitor 12'.

[0049] Moreover, if actuation which turns on this interlocking display switch 55 is performed and it sets up to a interlocking display mode, 2nd monitor 12' is made the interlocking display switch 55 of drawing 4 having formed, and the display condition of the 1st monitor (that is, monitor 12) functioning similarly with the gestalt of the 1st operation, and it being set as the condition display the image displayed on the display area H2 within a visual field further also in the gestalt of this operation. Others are the same configurations as the gestalt of the 1st operation.

[0050] The operation by the gestalt of this operation can display the image of arbitration also on monitor 12' further in the gestalt of the 1st operation. Moreover, when the interlocking display switch 55 is turned on, an image equivalent to three images observable by the way person side will be displayed on the screen of the 1st monitor 12 and 2nd monitor 12'.

[0051] Since a nurse side can also observe all the images that a way person can observe actually, and the image of all (three) equivalent to three images) on (concrete target according to the gestalt of this operation, the environment where it is easy to advance the operation by the cooperation by the side of a

way person and a nurse more smoothly is realizable.

[0052] In addition, although the operation microscope 5 has in **** the composition of observing the image with which a microscope image is also displayed on the eyepiece monitor 41 when it sees from the eyepiece optical system 40, you may enable it to observe optically the microscope image by the amplification optical system 37. That is, you may make it the configuration which observes optically the microscope image by the amplification optical system 37 according to the eyepiece optical system 40, displays other images by the eyepiece monitor 41 on the part in the area, and displays other images by the eyepiece monitor 41 on the part under a microscope image further.

[0053] In this case, what is necessary is to arrange a liquid crystal shutter etc. in the middle of an optical path, and just to make it display the image by eyepiece monitor 41 grade on the protection-from-light part by that liquid crystal shutter, in order to enable it to display other images on the display area H1 within a visual field formed so that a part of circular microscopic-field 41a might be cut and lacked.

[0054] Moreover, in order to enable it to display a microscope image by the monitor 12 side, to arrange beam splitters, such as a half mirror, in the middle of an optical path, and what is necessary is just made to carry out image formation of the light divided by the beam splitter to an image sensor 38.

[0055] [Additional remark]

1. Eye Contacting Part for Observing Object for Observation, and Display Means for Eyepieces Which Can Display Image on Said Eye Contacting Part, The picture signal generator which generates the 1st and 2nd video signal, and the 1st means for switching which switches and displays the image by the 1st and 2nd video signal on said display means for eyepieces, The 2nd means for switching which switches and displays the image for [said] observation, and the image by said 1st and 2nd video signal on a display means to have the display screen of predetermined magnitude, and said display means, The system control station characterized by having the control means controlled to interlock and to switch at least two kinds of observation images in said eye contacting part, and at least two kinds of display images in said display means.

[0056]

[Effect of the Invention] The eye contacting part for observing the object for observation according to this invention, as explained above, The display means for eyepieces which can display an image on said eye contacting part, and the picture signal generator which generates the 1st and 2nd video signal, The means for switching which switches and displays the image by the 1st and 2nd video signal on said display means for eyepieces, Since it has the control means controlled to interlock and to switch a display means to have the display screen of predetermined magnitude, the display in said eye contacting part, and the display in said display means By observing the image displayed on a display means, a nurse etc. can observe an image equivalent to the image which the way person is observing actually, and can offer the environment where it is easy to perform treatment by cooperation with a way person and a nurse more smoothly.

[Translation done.]